



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,773	12/02/2005	Oscar Divorra Escoda	208536-1	6710
52082	7590	04/16/2010		
General Electric Company GE Global Patent Operation 2 Corporate Drive, Suite 648 Shelton, CT 06484			EXAMINER ROBERTS, JESSICA M	
			ART UNIT 2621	PAPER NUMBER
			NOTIFICATION DATE 04/16/2010	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

gpo.mail@ge.com  
allyson.carnaroli@ge.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/540,773	<b>Applicant(s)</b> DIVORRA ESCODA ET AL.	
	<b>Examiner</b> JESSICA ROBERTS	<b>Art Unit</b> 2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-8 is/are rejected.
- 7) ☒ Claim(s) 9 and 10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Status of the Claims***

Claims 1, 3-10 are currently pending in Application 10/540,773. Claim 2 has been cancelled by Applicants amendment filed 01/19/2010.

### ***Acknowledgement of Amendments***

Applicant's amendment filed on 01/19/2010 overcomes the following objection(s)/rejection(s):

The objection to the specification has been withdrawn in view of Applicants amendments.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1, 3-10 have been considered but are moot in view of the new ground(s) of rejection.

### ***Allowable Subject Matter***

1. The indicated allowability of claim 2 is withdrawn in view of the newly discovered reference(s) to Redundancy-Driven A Posteriori Matching Pursuit based on the newly cited reference(s) follow.

### ***Claim Objections***

2. Claim 3 is objected to because of the following informalities:
3. Re claim 3, claim depends upon claim 2, which is a cancelled claim.
4. Appropriate correction is required. For purposes of applying prior art, claim 3 will be rejected as being dependent upon independent claim 1.

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1, 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neff et al., *Very Low Bit Rate Video Coding Based on Matching Pursuits* in view of Frossard et al., *A Posteriori Quantized Matching Pursuit*.

As to **claim 1**, Neff teaches video coding method of exploiting the temporal redundancy between successive frames in a video sequence, comprising the steps wherein a reference frame, called an I frame (3.4 Intraframe coding), is first approximated by a collection of basis function, called atoms (fig. 2a element find atoms), and wherein either the atoms (fig. 2a, element find atoms) are quantized, entropy coded (fig. 2a, element code atoms) and sent to a decoder (fig. 2a, output of

Art Unit: 2621

code atoms to fig 2b, decode bitstream) or the original frame is encoded (fig. 2) and transmitted to the decoder using any frame codec (fig. 2b) and wherein following predicted frames, called P-frames, are approximated by the geometric transformations of the basis functions (atoms) describing the previous frame (Neff teaches where after the motion prediction image is formed, it is subtracted from the original image to produce the motion residual. This residual is coded using the matching pursuit technique introduced in section 2, see 3.2 Matching Residual Coding. Therefore, it is clear to the Examiner that Neff discloses to predict frames using a matching pursuit algorithm which is composed of atoms, which reads upon the claimed limitation) and that the parameters of the geometric transformation (the matching pursuit algorithm is the used to decompose the motion residual signal into coded dictionary functions which are called functions, see 3 Detailed System Description) are, entropy coded (fig. 1a element code atoms) and sent to a decoder (fig. 1a output of element code atoms which is input to decode bitstream) in order to reconstruct the predicted frames (fig. 1b output of element current recon.) wherein the I-frame is approximated by a linear combination of N atoms (see 3.4 Intraframe coding) 
$$I(x, y) = \sum_{n=0}^{N-1} c_n \cdot g_{\gamma_n}(x, y)$$
 selected in a redundant, structured library and indexed by a string of parameters  $\gamma_{\text{sub}.n}$  representing the geometric transformations applied to the generating mother function  $g(x, y)$  where the  $c_{\text{sub}.n}$  are weighting coefficients (see 2. Matching Pursuit Theory, and equation 22.4 and Finding Atoms).

Neff is silent in regards to a reference frame called an I frame, and either the atoms are quantized, and predicted frames, called P-frames.

However, Frossard teaches the atoms are quantized (Moreover, if the dictionary is very large to ensure a good convergence or even if it contains real parameters, the atoms should be quantized before transmission see pg. 14 IV. Signal Reconstruction Error and pg 23 VI. Quantization of Structured Atoms Indexes).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Frossard with Neff for providing improved image processing.

As to **claim 3**, Neff (modified by Frossard) as a whole teaches everything as claimed above, see claim 1. In addition, Neff teaches video coding method according to claim 1, wherein the atoms occurring in the decomposition are chosen using the Matching Pursuit algorithm (see 3.2 Matching-Pursuit Residual Coding).

As to **claim 4**, Neff (modified by Frossard) as a whole teaches everything as claimed above, see claim 1. In addition, Neff teaches the video coding method according to claim 1, wherein the parameters and coefficients of the atoms are entropy coded ((Neff teaches when the atom decomposition of a single residual frame is found, it is important to code the resulting parameters efficiently, see Coding Atom Parameters pg. 369 and fig. 2a element code atoms).

Art Unit: 2621

Neff is silent in regards to the parameters and coefficients of the atoms are quantized.

However, Frossard teaches the atoms are quantized (Moreover, if the dictionary is very large to ensure a good convergence or even if it contains real parameters, the atoms should be quantized before transmission see pg. 14 IV. Signal Reconstruction Error and pg 23 VI. Quantization of Structured Atoms Indexes).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Frossard with Neff for providing improved image quality.

As to **claim 5**, Neff (modified by Frossard) as a whole teaches everything as claimed above, see claim 4. In addition, Neff teaches video coding method according to claim 4, wherein the quantization of the parameters and the coefficients vary across time and the variation is controlled by a rate control unit (see. 3.3 Buffer Regulation).

As to **claim 6**, Neff (modified by Frossard) as a whole teaches everything as claimed above, see claim 1. In addition, Neff teaches video coding method according to claim 1, wherein the method is used together with a residual frame based texture codec that encodes the differences between the original frames and the ones reconstructed using the compensated atoms (see 3.2 Matching-Pursuit Residual Coding).

Art Unit: 2621

4. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neff et al., *Very Low Bit Rate Video Coding Based on Matching Pursuits* in view of Frossard et al., *A Posteriori Quantized Matching Pursuit* and further in view of Well Known Prior Art (Official Notice).

As to **claim 7**, Neff (modified by Frossard) as a whole teaches everything as claimed above, see claim 1. Neff is silent in regards to video coding method according to claim 1, wherein the geometric features (atoms) of the I-frame are computed from the quantized frames at the encoder and decoder and are not transmitted.

However, Official Notice is taken that both the advantage of concept of proving the limitations as claimed are notoriously well known and expected in the art, thus it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the limitations as claimed with Neff (modified by Frossard) for providing improved image quality.

As to **claim 8**, Neff (modified by Frossard) as a whole teaches everything as claimed above, see claim 1. Neff is silent in regards to video coding method according to claim 1, wherein the geometric features (atoms) are re-computed after each quantized frame at the encoder and decoder and replace the previous prediction.

However, Official Notice is taken that both the advantage and concept of providing the limitations as claimed are notoriously well known and expected in the art and would have been obvious to one of ordinary skill in the art at the time of the



Art Unit: 2621

invention to incorporate with Neff (modified by Frossard) for providing improved image quality.

### ***Allowable Subject Matter***

1. Claims 9-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

2. The following is a statement of reasons for the indication of allowable subject matter: The present invention as claimed involves a video coding method according to claim 1, wherein the geometric transformations used to build the library are composed of translations, anisotropic dilations and rotations, applied to a generating mother function  $g(x,y)$  by means of the following change of variables:

$$g_s(x,y) = \frac{1}{\sqrt{a_1 a_2}} g(x_s, y_s), \text{ where}$$

$$x_s = \frac{\cos \theta (x - b_1) - \sin \theta (y - b_2)}{a_1}$$

$$y_s = \frac{\sin \theta (x - b_1) + \cos \theta (y - b_2)}{a_2}$$

, and wherein the generating mother function is of

$$g(x,y) = (1 - r^2) \exp\left(-\frac{x^2 + y^2}{2}\right)$$

the following form:

### ***Conclusion***

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

4. Sekiguhi et al, US-7,245,659

Art Unit: 2621

5. Kopet et al., US-5,448,310
6. Vleeschouwer et al., US-2002/0114393 A1.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JESSICA ROBERTS whose telephone number is (571)270-1821. The examiner can normally be reached on 7:30-5:00 EST Monday-Friday, Alt Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha D. Banks-Harold can be reached on (571) 272-7905. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Marsha D. Banks-Harold/  
Supervisory Patent Examiner, Art Unit 2621

/Jessica Roberts/

Application/Control Number: 10/540,773

Page 10

Art Unit: 2621

Examiner, Art Unit 2621